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# CUESTA

 The Niagara Escarpment Magazine

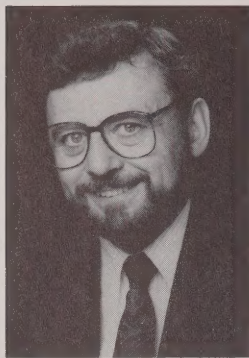
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University of Toronto





## Minister's Greetings

It is once again my pleasure to bring you greetings as minister responsible for the Niagara Escarpment Program.

As a reader of Cuesta, you will have heard of the Five Year Review of the Niagara Escarpment Plan.

The review process is in its final stages, the end product being a revised Plan.

After lengthy public hearings that considered a wide range of issues related to the Plan and the Niagara Escarpment Commission (NEC), the Hearing Officers submitted their report in March 1993. The NEC examined the report and submitted its final proposals to me in August 1993.

Based on the Hearing Officers' report and the NEC's proposals, I will make recommendations to Cabinet to improve the Plan. Cabinet makes the final decision.

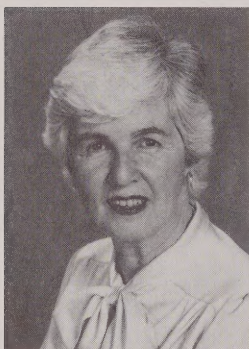
The aim of the review is to determine how the Plan can best reinforce the high standards we have established for the protection of Ontario's Niagara Escarpment.

Inspired foresight led to the creation of the Niagara Escarpment Plan almost 10 years ago. This action locally has earned us attention globally. The escarpment's designation as a UNESCO World Biosphere Reserve reminds us of our wider role in the future of our planet.

This is a big responsibility, but well worth accepting given how the Niagara Escarpment enriches our province and its citizens. I am proud to be a part of this program. Best wishes and thank you for your support.

*Bud Wildman*

C.J. (Bud) Wildman, Minister of Environment and Energy



## Chair's Message

Reports about the planet's health are generally gloomy. On a typical day, we lose 116 square miles of rainforest, or about an acre a second. We lose 72 square miles to encroaching deserts. We lose 40 to 100 species.

I'm troubled, sometimes discouraged, by these staggering numbers. Are we making gains anywhere?

Understandably, I delight in any piece of news about places where the natural world is holding up or recovering. Research in progress suggests that Ontario's Niagara Escarpment is one of these places.

Escarpment watchers already know about University of Guelph scientist Doug Larson who found that the cliffs of the escarpment support an old growth forest of sorts. Gnarled Eastern White Cedars clinging to the cliff edges are up to 1,000 years old, making them the oldest living trees in eastern North America. Now, Dr. Larson finds that the rock itself is alive with plant life the likes of which have been found in Antarctica and the Colorado Plateau in Arizona.

Ministry of Natural Resources (MNR) researchers

are also making important discoveries. They confirm that the escarpment's undisturbed lands contain concentrations of plants and wildlife that are rare or eliminated elsewhere in Southern Ontario. They credit the protective mechanisms of the Niagara Escarpment Plan.

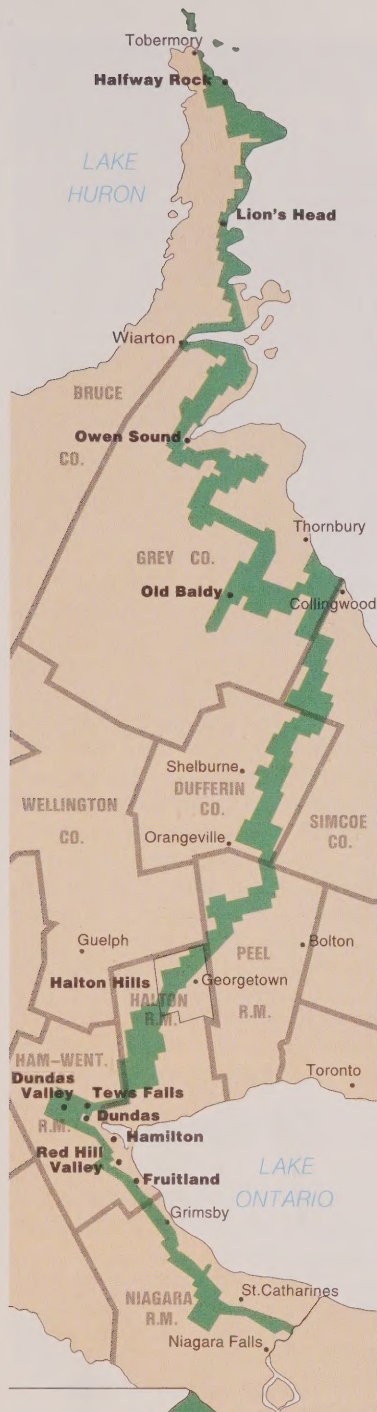
Their findings, to be published next year, also show that the escarpment's unbroken natural lands are a highway of sorts for many delicate species of flora and fauna. Several species have expanded their range thanks to the escarpment.

I am excited, not just by these discoveries but by the certainty that there is much more to come. They begin to prove what many of us already know from direct experience, that the Niagara Escarpment really is a lively and, in some areas, growing natural world. We are making a difference!

*Joan Little*

Joan Little, Chair





- .....Story Location  
 .....Niagara Escarpment Plan Area

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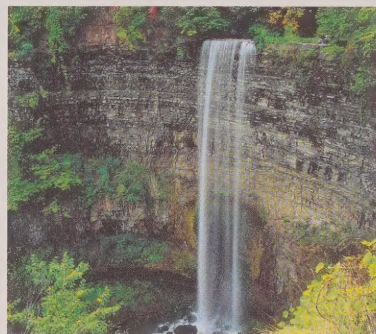


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### CUESTA

Originally a Spanish term meaning flank or slope of a hill, in geological terms means a ridge composed of gently dipping rock strata with a long gradual slope on one side, and a relatively steep scarp on the other

⊕ This paper stock contains 10% post-consumer waste & 50% pre-consumer waste  
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Ontario



## Award winners protect, restore private lands

Residential landowners, a resort and a quarry operator were among the winners of the 1993 Niagara Escarpment Development Achievement Award.

The award recognizes property development that is exceptional in its compatibility with the escarpment's environment.

"These people made an extra effort to protect or restore the environment," said Niagara Escarpment Chair Joan Little. "Their work shows that personal enjoyment and public benefit can be compatible."

Development need not be spectacular to win. In fact, you're as likely to get an award not for what you see, but for what you don't see.

Pamela and Allan Macfarlane realigned the driveway to their farmhouse and barn in Clearview Township, Simcoe County. What was judged special was their relocating 45 white spruce trees and the naturally grouped plantings they added around their home.

The Talisman Mountain Resort in Euphrasia Township, Grey



*Talisman Mountain Resort in Kimberley.  
Photo: Rick Chard*

County got their award for a parking lot. Traffic flow, drainage, lighting and scenic values were improved by blending the parking area into the landscape of the panoramic Beaver Valley.

Walker Brothers Quarry Limited were recognized for rehabilitation and landscaping work they did on various sites on their Thorold property in Niagara Region. The NEC felt that Walker Brothers went beyond the normal requirements to repair disturbed land by recreating pockets of native vegetation in visually prominent areas.

The other award recipients were Carol and Bill Bannister, St. David's, Niagara Region; Frances and Jim Bull, Flamborough, Hamilton-Wentworth; Judi and Robert Storey, Town of Halton Hills, Halton Region; Judith and Ted Solecki, Town of Caledon, Region of Peel; Reinis and Pille Piegaze, Township of Mulmur, Dufferin County; and, Scott Lorrman and Marleen Grolman, Clearview Township, Simcoe County. 🌲

## Holding onto heritage

What makes the place you live special? That was the question posed to 60 people from the Town of Halton Hills for a report on preserving rural landscapes along the Niagara Escarpment.

Area residents were surveyed for their opinions on cultural and natural features, community values and traditions. They then got cameras to take photos of local landmarks they thought contributed to the rural character of their area.

Workshops were held in five settlement areas along the escarpment. Small groups of people talked about heritage qualities in their communities and how best to nurture and protect them.

"This approach revealed that people do feel strongly about their communities and appreciate being involved in the planning process," said project coordinator Pam Kaufman. "Planning is shifted from a market approach based on profit to a community approach based on common values."

Project organizers Heritage Halton Hills hope their efforts to stimulate citizen participation are good enough to be copied by other local conservation groups in Ontario.

The project was funded by Halton Hills and the Ontario Heritage Foundation's Niagara Escarpment Trust Fund. A draft report has been sent to regional and local government and planning agencies. 🌲

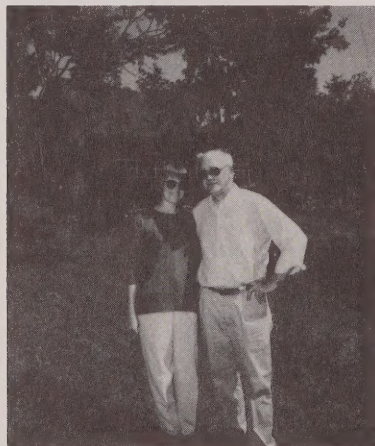
## Moving? Keep in Touch

About 7,000 people get Cuesta magazine free at their home, office, school or library.

Each year many Cuesta's are returned to us when people move.

If you move, please remember to send us a change of address card. Keep in touch with the escarpment!

**Niagara Escarpment  
Commission  
232 Guelph Street  
Georgetown, Ontario.  
L7G 4B1**



*1993 DAA recipients Pille and Reinis Piegaze  
from the Township of Mulmur.  
Photo: Rick Chard*



# Cryptic Cliffs

By Brad Cundiff



*Cross section of escarpment rock and the bright green evidence of cryptoendolithic organisms "growing inside rocks".*

*Photo: Doug Larson*

Doug Larson has made a habit of exposing the secrets of the Niagara Escarpment. The University of Guelph botanist who first discovered that many of the small, stunted cedars growing on the edge of the escarpment are hundreds of years old has now uncovered tiny organisms growing inside the rocks that the cedars cling to.

Larson and his associate Uta Matthes-Sears were working to free a cedar root from its rocky cliff-hold when they noticed bright green markings on the inside of the limestone chips they had been breaking away. Back in the lab, Larson and his botany colleagues confirmed that the bright green lines running through the freshly cut limestone pieces were made up of cryptoendolithic ("growing inside rocks") organisms — a group of organisms that had previously been recorded only in rock

samples collected in Antarctica, Arizona and the Negev Desert.

What's interesting about these algae, fungi and lichens, Larson explains, is that they are

rock crystals.

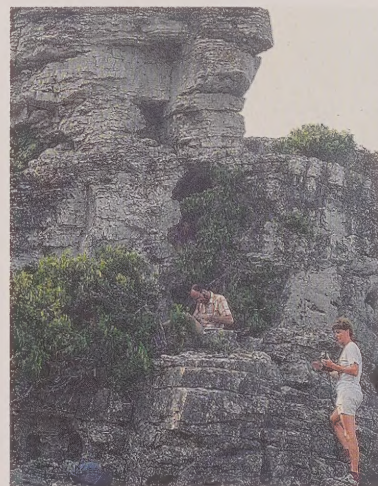
"It's like you or I going caving," he says.

Joseph Gerrath, an associate professor of botany at the University of Guelph, also points out that the algae growing within

## Cryptoendoliths:

**Until now, this group of organisms was thought to exist only in Antarctica, Arizona and the Negev Desert.**

not exploiting hairline cracks or fissures to get inside the rock but "actually penetrate the solid matrix of the rock itself." The organisms, he adds, don't see the naturally porous limestone as solid — they thrive in the microscopic gaps between the



*Researchers at a study site on the Bruce Peninsula. From top to bottom: Peter Kelly, Doug Larson and Ruth Bartlett. Photo: Calvin Clark*





*Above: After the rock is cut open, samples are scraped from the 1 mm thick green line where the cryptoendoliths live. Photo: Richard Armstrong.*

the rocks are photosynthetic organisms — they require sunlight to survive. "Light penetrates [limestone] quite easily," he notes, allowing the algae to grow as much as six millimetres below the rock's surface. In fact, Gerrath believes the algae, fungi and less-visible lichens have actually found themselves a fairly hospitable home in the rocks: "They have protection from drying winds, are exposed to less severe temperatures and there is constant moisture inside the rocks," he explains.

What the researchers would like to know now, says Larson, is what role these organisms play in the escarpment ecosystem. Gerrath has managed to identify a number of green, blue-green and at least one yellow-green algae in samples collected from a number of escarpment sites and then cultured in his lab. (As the algae go through a number of life stages, scientists need to study the organisms' full life cycle in order to make a positive identification.) It's well known that blue-green algae in particular

fix nitrogen, and if these algae produce enough of a nitrogen surplus, it could be enriching the entire escarpment ecosystem,

## **Cryptoendoliths might actually be feeding trees on the cliff.**

Larson speculates.

"We know the cedars are not nitrogen limited," he says, and that fact points to the possibility that it is the cryptoendolithic organisms that are feeding the trees this important element. Then again, Larson adds, the nitrogen could also be leaching out of another source, such as vulture droppings.

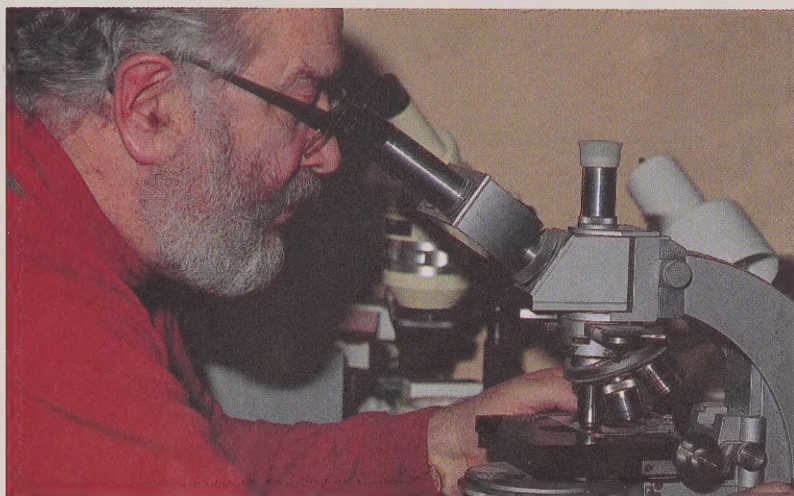
Just as intriguing to Larson is the idea that his find may indicate that the rocks of the escarpment are "alive." Blue-green algae, he notes, secrete limestone and therefore the organisms found within the rocks "could be building a thin film of limestone on the escarpment right now."

The original discovery of the cryptoendoliths was made in 1993 on the site of an old quarry that had been worked up until about 1945. That means that the rock-penetrating organisms could only have become established on this site during the past half-century. And Larson thinks that

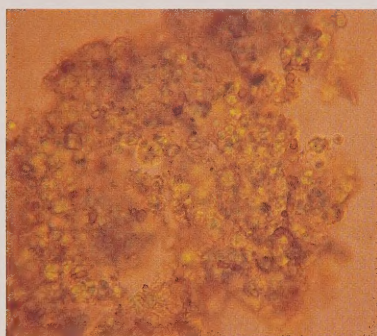


*Above: Using a sterilized loop, Prof. Gerrath carefully removes a sample of the organisms which have been growing inside the Petri dish for up to nine months. Photo: Richard Armstrong*





*Above: Scientists need to study the organisms' full life cycle to make a positive identification. Photo: Richard Armstrong*



in turn may mean that they play a pioneering role in the ecosystem. Gerrath's finding that a number of the algae cultured from the escarpment rocks are ones also commonly found in soils would seem to support the thesis that wind-deposited algae are responsible for beginning the unseen task of creating conditions suitable for other plant life on seemingly sterile rock.

But the important thing to remember in all of this speculation, Larson points out, is that the bright green lines in the escarpment rocks represent a whole new habitat discovery, not just the discovery of a few individual organisms. Whether this "inside-the-rock" world is



**The bright green lines in the escarpment rocks are not just a few individual organisms but a whole new habitat.**

something limited to the escarpment or common to many exposed rocks is hard to say, he acknowledges, due to the lack of research being done on the question elsewhere. Still, he says, this finding "just adds to the fascination" of studying the Niagara Escarpment. 🐾

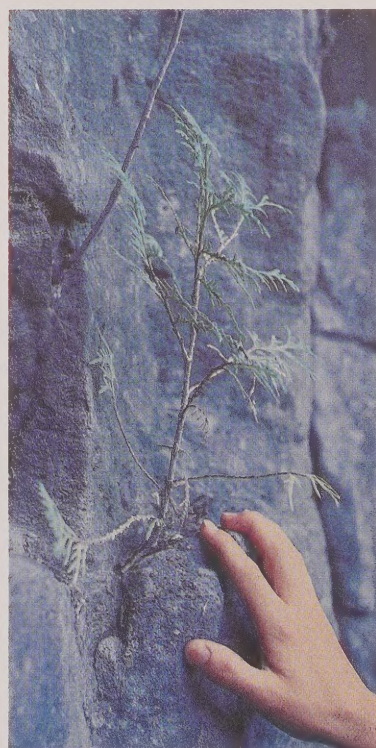
*Brad Cundiff is an environmental writer living in Toronto.*



*Above: Gerrath makes detailed drawings of the organisms using a tracing device on his microscope. Photo: Richard Armstrong*

*Below left: Green algae among rock particles. Photo: Joseph Gerrath*

*Below right: Filamentous fungus taken from Petri dish culture. Photo: Joseph Gerrath*



*Above: Larson believes that the tiny organisms recently discovered in the rocks play an important role in the existence of the cedars that cling for their life to the cliff-faces of the escarpment.*

*Photo: Doug Larson*



# Environmental Perspective



A group of Hamilton artist's are painting in their "backyard" and bringing an awareness of local natural environment to their community.

Quoting a portion of Heather Lindsay's poem, Dundas artist Catherine Gibbon extends both hands, then draws them inward to illustrate the imagery. "Pullness - I love that word."

To Gibbon, "pullness" expresses perfectly a sense of connection with our surroundings, that mysterious tugging that draws us back again and again to a favourite tree-lined hillside, that unseen force that grounds us to a particular place or community. And it connotes the message that she and a group of Hamilton area landscape artists hope to convey through "On the Edge," their three-year art-environment project devoted to raising public awareness of local natural environment.

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*Watch the wind  
Hear the air  
Smell the richness  
of the soil  
crooked branches  
Arches in the sky  
Stationed, staring  
diverging visions  
Immersed in the pullness  
of the land.*

*Heather Lindsay  
August 1992, Griffin Farm*

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The idea of inviting local artists to spend three weekends camping and painting in parts of the Beverly Swamp, the Dundas Valley and the Red Hill Valley sprang from a similar venture staged in 1991 by the Temagami Wilderness Society. Gibbon and her fellow "On the Edge" organizers - Hamilton's Robert Ross and Flamborough's Patricia Kozowyk - had camped out along with others to paint the Temagami wilderness and to protest against logging practices.

In the spirit of thinking globally and acting locally, the trio wanted to replicate their experience closer to home. Each had a specific location and associated environmental concern in mind: residential development



Robert Ross, "Moon over Cootes"- acrylic on canvas, 24" x 60"





## By Andrew Vowles

in the Dundas Valley, a proposed freeway in the Red Hill Valley and development near the Beverly Swamp.

But the idea soon snowballed far beyond a simple environmental crusade. Through a series of community art exhibitions, public lectures, a travelling exhibition, even publication of a book, "On the Edge" would allow the artists to draw public attention to the value of local natural environment.

"We're going beyond encouraging environmental preservation," Gibbon says. "We're talking about our cultural identity."

After a test camp in the summer of 1991, they invited about 20 professional landscape

artists the following spring to the first official camp in the Beverly Swamp. In mid-summer, the group staked out the abandoned historic Griffin Farm overlooking the Dundas Valley. The third excursion took place in autumn on the edge of the Niagara Escarpment overlooking the Red Hill Valley in east Hamilton. The organizers provided the

**"We're going beyond encouraging environmental preservation," Gibbon says. "We're talking about our cultural identity."**



Elizabeth Halliwell, "Trees Please"  
watercolour, 13" x 20"

necessities, leaving the artists free to spend their weekends sketching, painting, or simply looking for inspiration. There was only one ground rule: participants had to produce works of art inspired by the local landscape and escarpment.



Linda Hankin, "By the barn overlooking the valley"  
oil on canvas, 25" x 20½"



Above: Artist Michael Dobson steps back to look at his painting while on location at the Dundas Valley Artist Camp.

*Photos By:  
"On the Edge" Committee.*





Barbara Guy Long, "Powerline Road" - acrylic on paper, 26" x 40"

From each camp, the artists created an average of two works each, mostly sketches and paintings in a variety of media

**"On the Edge"**  
**connotes a number of**  
**things - the edge of the**  
**escarpment, the edge**  
**of extinction.**

and forms. Many were shown in subsequent exhibitions in area galleries, libraries and interpretive centres.

To attract public attention, the group launched each of the three exhibitions with a slide lecture on the natural history of the particular locale. For example, the final show last fall began with a lecture on the heritage of the Red Hill Valley, and a talk by the director of the Ontario Archaeological Society about a native pendant that one of the artists had discovered on the escarpment. (Made of slate believed to be from Ohio, the

pendant provides evidence that natives living around the valley and escarpment some 4,000 years ago were part of a relatively far-flung trading network.)

Running the camps and their associated exhibits cost a total of about \$25,000. Co-sponsored by the Carnegie Gallery in Dundas and the Conserver Society of Hamilton and District, the non-profit group has relied heavily on volunteer work and donations from numerous organizations. It has also raised money through sales of cards and posters made for each exhibition and from the proceeds of auctioning off a selected work from each camp.

For 1994, the group will organize a travelling exhibition of the works from all three camps in public galleries throughout southern Ontario. Among the show's planned stops are Grimsby and Chatham, where local artists hope to exhibit works from their own versions of "On the Edge" camps.

The group also plans to publish a book later this year or

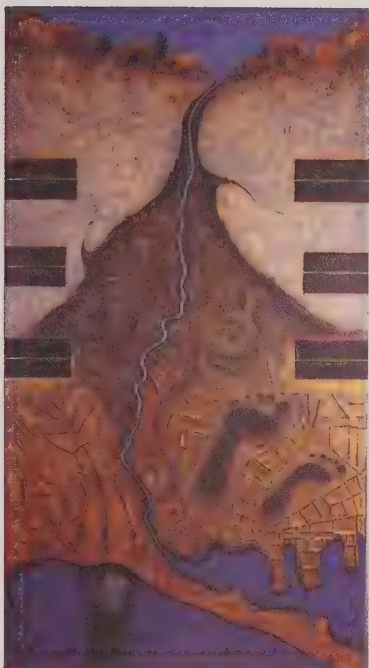
in 1995 that will include many "On the Edge" works and selected environmental writings. Although organizers have been allotting any surplus funds toward production of the book, they'll have to seek considerably more money, likely from granting agencies. Pat Kozowyk says "On the Edge" will give any profits from the book's sales to local authorities like the Hamilton Region Conservation Authority (HRCA) toward preservation and purchase of public lands.

So what do the artists hope to accomplish? While individual members might - and do - oppose housing developments in the Dundas Valley or expressway construction through the Red Hill Valley, Kozowyk says "On the Edge" is not a political or protest group. "Protest implies a negative," she says. "We're trying to celebrate and affirm (our local natural heritage)."



Patricia Kozowyk, "Maple"





Robert Clark Yates  
*"Red Hill Valley"*  
 acrylic on canvas, 2' 4" x 4' 8½"



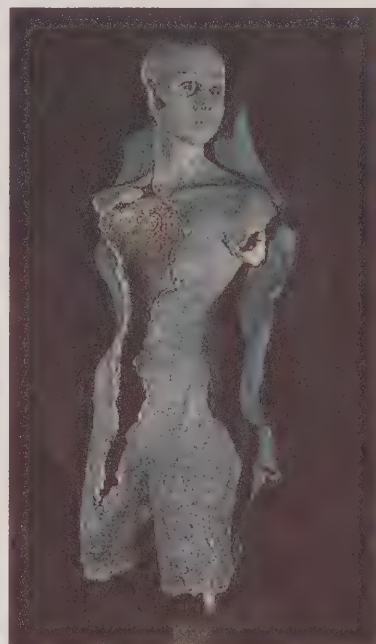
Lynn McIntyre, *"Spencer Creek"* silver gelatin print, 26 x 34 cm



For 1994 the group will  
 organize a travelling  
 exhibition of the works  
 from all three camps.

"On the Edge" connotes a number of things - the edge of the escarpment, the edge of extinction. Most importantly, says Gibbon, the words reflect the idea that, for many of us, the local landscape and environment are often only peripheral concerns: "The concept of the land is not central enough to our conscience."

The project allows artists and viewers alike to explore their own personal connections with their surroundings, she says, to get to "know" the land - to feel its pullness. 🌲



Juliet Jancso, *"Of Fields & Sky"*  
 stained ceramic sculpture,  
 27" high



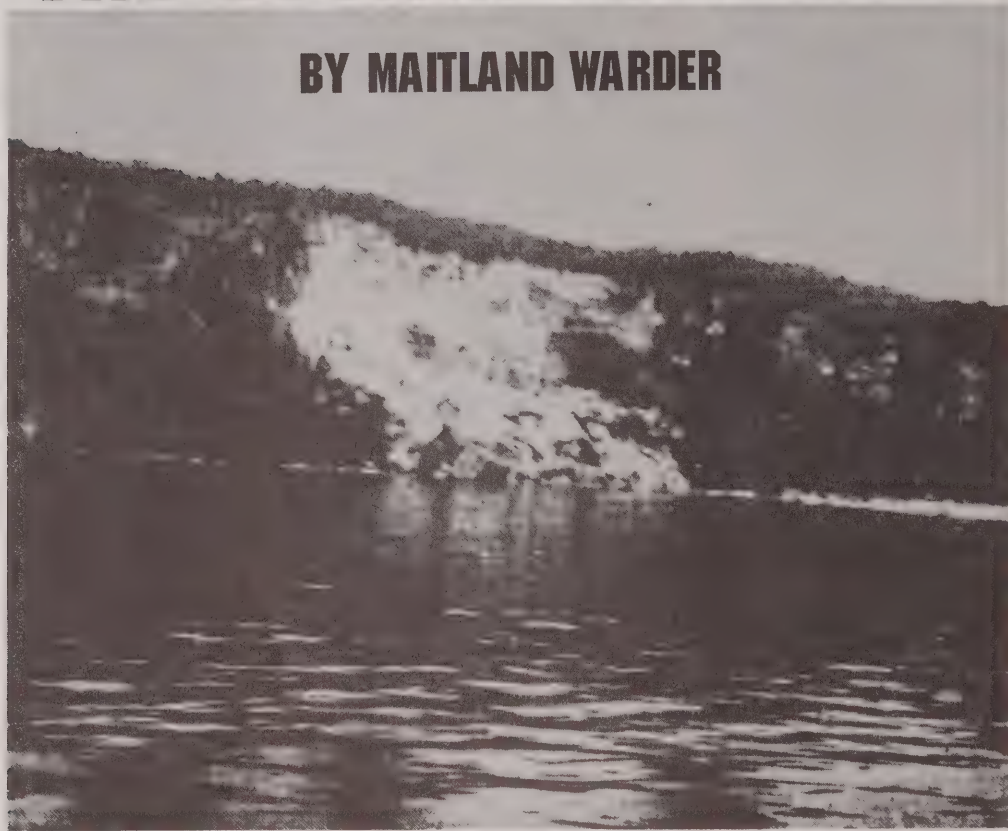
- chalk pastel on paper, 36" x 44"

Andrew Vowles is a writer living  
 in Hamilton.



# THE DAY THE ESCARPMENT FELL

BY MAITLAND WARDER



It was April 17th, 1934 and the Tug Harrison had been making ready for some time to open navigation out of Owen Sound to Lion's Head, Tobermory, Fitzwilliam Island and the North Shore. It had been a winter of severe frost penetration in the Bruce Peninsula because of the lack of adequate snow cover. When our hockey team returned from a game in Wiarton one night, there was a reading of -30F on the

thermometer on the corner of Bruin Brothers Hardware in Lion's Head.

The first frost had produced accumulations of ice more than two feet thick on the inland lakes and the harbours of Grey-Bruce. Spring navigation was delayed. Breaking the ice out of Owen Sound Bay was not an easy task but the Tug Harrison made its way to open water and headed north. A west wind had cleared Isthmus Bay and the tug was

soon at the Lion's Head dock and after a few minutes was on course for Cabot's Head and then west to Tobermory.

But the crew's attention, normally occupied with assessing ice conditions, was focused on the mainland, for there was a visible change in this familiar landform west of Halfway Rock. Several hundred feet of cliff face has lost its bond to the escarpment and spilled down the talus slope to the waters edge! It made front



page news in the Owen Sound Sun Times upon the tug's return. However, more detailed information and photos had to wait till the drift ice was gone and the shoreline afforded a closer look.

On June 6th, the M.S. Normac left Owen Sound for its run to the north with Sun-Times staff aboard. The jutting shoreline allowed the Normac to come in close for visual examination and photographs.

Extracts from the Sun-Times of June 7th and June 23rd, 1934 reflect the magnitude of the slide and its visual impact on its first spectators:

"High up on the cliff that towered above the green line of the shore there appeared a thin white mark, just a brush mark on the dirty white of the limestone cliffs. The M.S. Normac of the Owen Sound Transportation Co., bound for Tobermory from Owen Sound and now about half way between her destination and Cabot's Head, swung off her course and headed for that tiny white mark on the cliff.

"Gradually, as the boat



*The great rock slide today. "What had been merely a white line became a mass of jumbled rock." Photo: Willy Waterton*

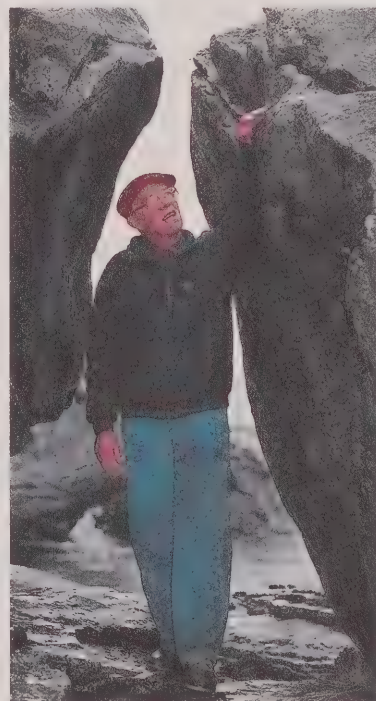
drew nearer, the white mark seemed to grow wider. Then a strange thing became apparent. The white, shining new against the dull white of weather-beaten rock, did not stop at the green of the fringe of trees along the shore; it extended right to the water's edge.

"When the Normac had approached nearer yet, it was evident that the white mark was

the result of a rock-slide; that the face of the cliff had fallen in. Viewed from this distance, there

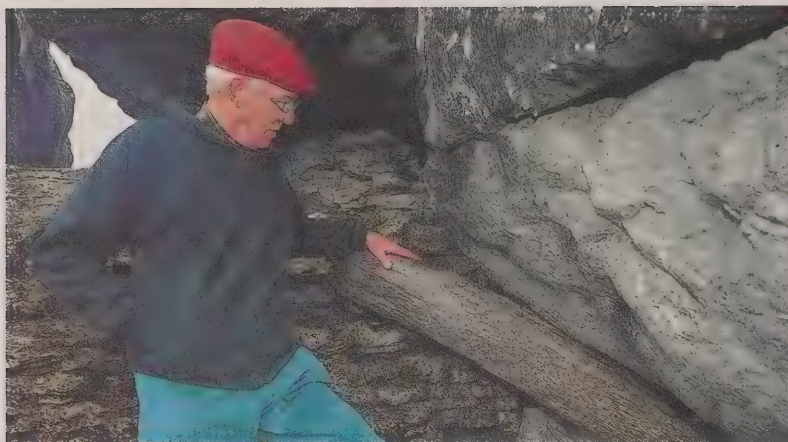


*M.S. Normac. Photo courtesy: Grey-Bruce County Museum*



*Author Maitland Warder stands against one of the boulders that fell to the shore of Georgian Bay near Halfway Rock sixty years ago. Photo: Willy Waterton*





Warder examines cedar log jammed between the rocks. Photo: Willy Waterton

was nothing impressive about the rock-slide. It was just a mark on the face cliff.

"Glasses were called to the aid of the naked eye. What had been merely a white line became a mass of jumbled rock. Huge chunks as big as houses could be seen piled on the water's edge. The eye travelled back along the route they had come, rolling to a stop on the shore after bounding through the fringe of trees above the beach. There, back of the trees, was the cliff from which they had dropped.

"By this time the boat was near enough to shore for the rocks to be seen with the naked eye. Passengers and crew crowded to the rail, while the boat slowed down to allow all a good look at the evidence of nature's forces, an evidence that was practically unnoticeable at comparatively trifling distances but which was a forcible reminder of man's insignificance when brought into close-up.

"There towered the cliff, 150 feet high, looking down on a narrow strip of beach clothed with evergreens and other trees. For the matter of about 200 feet there was a white gash on the

cliff. It's face had been cleanly shaved down for a distance of about seventy five feet, then came the huge mound of displaced rock, covering the trees and the beach and thrusting itself out into the waters of the bay.

"Up at the top of the rock to the east, could be seen a huge mark as if a giant knife had been driven into the rock and used to pry loose the chunks lying on the beach below. It was suggested among those viewing the sight, that lightning might have been responsible for the slide. This mark seemed to lend strength to this theory.

Another suggestion was that the slide was merely the result of the unusually hard winter experienced in this section. "Whatever the cause, the slide made an impressive sight at a distance of a few hundred feet, and a very small and unnoticeable mark as it quickly disappeared astern when the Normac's engines started to throb once more."

*Maitland Warder is editor of "The Crofter", a newsletter published by the Lion's Head Pastoral Charge, United Church of Canada, where this story was first published.*

## A Geologist Explains

This account describes the final stage of an event called mass wasting. It's one of the many ways that the Niagara Escarpment undergoes erosion.

Water freezes and thaws in cracks and joints of the dolostone caprock. Sections of rock are gradually wedged apart.

Beneath the caprock, shale rocks become moist and slippery. The blocks tilt and move toward the edge of the escarpment where gravity causes them to fall.

On their ride down, rocks rub and grind against each other. Trees are mowed down. The fresh surfaces dramatically contrast with surrounding weathered rock.

During the initial stages of a rock slide, as the blocks are wedged apart, crevice caves develop. These exist at several places along the escarpment, geologic evidence of one way in which the escarpment is ever changing its face.

*Walter Tovell*



Above: Children on a field trip explore a crevice cave at Mount Nemo near Milton Photo: Halton Region Conservation Authority



# *A Natural Treasure*

*By Gloria Hildebrandt*

A new scientific study uncovers  
some pleasant surprises.



For three years a team of Ministry of Natural Resources

*(over)*



scientists has tramped the Niagara Escarpment, maps and aerial photos in hand. They noted everything they saw, the birds overhead, the moss growing on logs and the creatures beneath them, the escarpment rock itself.

The observations are part of an ecological survey of Areas of Natural and Scientific Interest (ANSI's) on the escarpment. The escarpment has more parks and ANSI's than any other geographic region in Ontario.

The study won't be finished for another year but preliminary findings are considered so significant that the researchers already recommend maintaining vigorous protection for the escarpment. They also call for the recognition of more natural corridors to link the escarpment



The Common Raven and other wildlife have expanded their range thanks to the escarpment. Photo: Robert McCaw

to nearby wild areas.

The ANSI inventory was begun in 1990 with funding from the Niagara Escarpment Trust Fund and the Ministry of Natural Resources. It will revise and expand on similar work done in

**The study demonstrates the importance of the escarpment as a corridor and refuge for wildlife.**

1976, when the province was putting together a land use plan for the escarpment. Results will be presented in a comprehensive



Above: The Massasauga rattlesnake, rare in parts of Ontario, remains in good numbers in the northern part of the Bruce Peninsula. Photo: James Kamstra.

Page 13: Old Baldy Conservation Area shows how the escarpment landform creates natural diversity. Eastern White Cedar grows in the thin layer of soil surrounding the exposed cliffs. Sugar Maple grows in rich black loam above the cliffs and Aspen and Birch survive in the sandy soil below. Photo: Jarmo Jalava

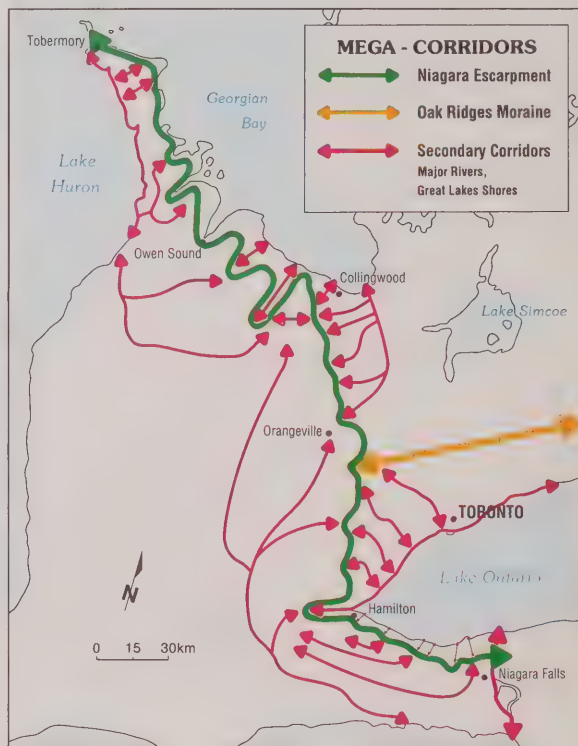


Figure 1: MNR scientists see potential for the escarpment as a core natural area with adjoining feeder corridors. Map: Margaret McLean and Steve Varga, MNR.





*Above: Forest cover permits the free movement of wildlife. Here at Fruitland, housing breaks up the natural flow of the Escarpment.  
Photo: Steve Varga.*

report on the ecology of the Niagara Escarpment World Biosphere Reserve in 1995.

The study demonstrates how important the escarpment is as a corridor and refuge for wildlife. There have been reports that the Black Bear is expanding its range to the south, from where it had been eliminated in the last century. Unusual all-female hybrids of the Jefferson X Blue-spotted salamander occur all along the escarpment, and Ontario's only population of the endangered Northern Dusky salamander is found along the Niagara River. All eight of Ontario's bat species can be found in the escarpment's caves or hollow trees of old growth forests.

Birds that are rare in southern Ontario are sustained by the escarpment's large natural areas. There are Bald Eagle, Red-shouldered Hawk, Sandhill Crane, Common Raven, and Barred Owl. Sensitive species

such as Veery and Red-eyed Vireo show dramatic population increases in woodlands larger than 1,000 hectares.

Biologists John Riley, Jarmo

***Birds that are rare in southern Ontario are sustained by the escarpment's large natural areas.***

Jalava and Steve Varga led a team that studied birds, amphibians, reptiles and plant communities. Among their findings were the rare fern species Wall-rue, Walking Fern, and North America's largest concentration of Hart's-tongue. The now famous stunted Eastern White Cedars that grow on cliff faces are up to 1,000 years old.



*Above: The Hooded Warbler, a provincially rare species, nests in the southern most part of the escarpment.*

*Photo: William J. Rainer/Ron Kingswood.*



"The escarpment is the most diverse region in the province," says Varga. "It's a spectacular slice across Ontario's vegetation zones."

In the south, for example, are trees characteristic of eastern deciduous forests, including Black Maple, Tulip Tree, Sassafras and Pignut Hickory. It's another world on the Bruce Peninsula in the north, where boreal trees such as Trembling Aspen, Balsam Fir and White Spruce predominate.

Geologist Phil Kor's work supports a new theory that about 14,000 years ago a catastrophic flood of glacial meltwater in Hudson Bay burst south from beneath the glacier with tremendous pressure on the escarpment. The Lion's Head ANSI on the Bruce Peninsula provides good evidence. At MacKay's Harbour a field of

*Right: Tews Falls today. The widening gorge downstream suggests it was once the size of Niagara Falls.*

*Photo: Richard Armstrong*



*Above: Jefferson Blue-spotted salamander. Photo: Robert McCaw*

### ***A catastrophic flood burst south from Hudson Bay.***

boulders on the shore stands out from the surroundings. The rocks are unusual for the area. They are rounded, about 1½ metres in diameter and similar in composition to the Canadian Shield rock found in the Sudbury area.

Kor concludes that they were carried there from the other side of Georgian Bay, a distance of about 150 km, by a flood that was five to 10 metres deep and at least 100 km wide the flood may





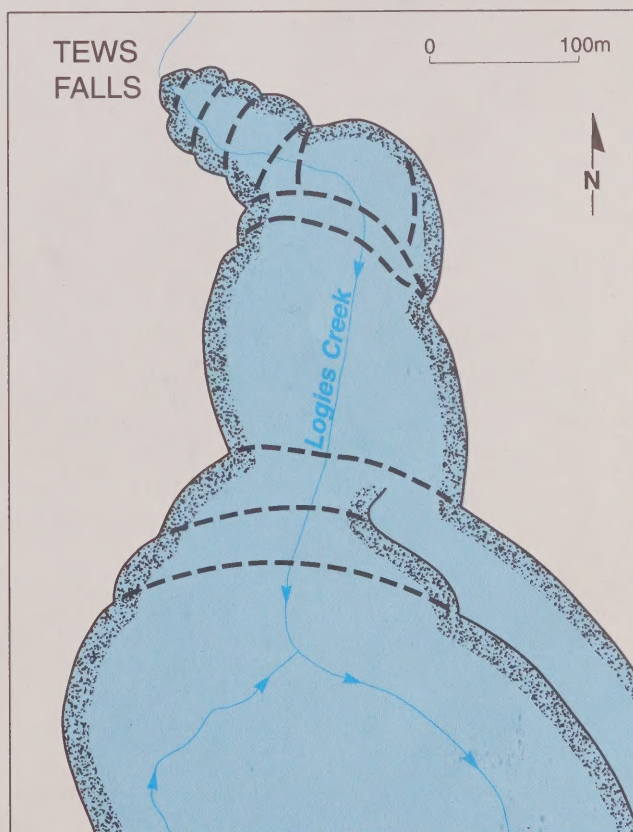
Above: Unusual potholes at Hope Bay Nature Reserve are thought to have been caused by the churning turbulence of glacial flood waters. Photo: Phil Kor.

Right (Fig. 2): Tews Falls left behind bowl shaped basins in its 12,000 year retreat up Spencer Gorge. Diagram: Margaret McLean and Phil Kor, MNR.

have lasted only a few days to a few weeks.

In the Spencer Gorge ANSI near Dundas, Kor counts 10 punchbowls, bowl-shaped basins that increase in size the further they are from Tews Falls (Figure #2). Erosion from ancient waterfalls caused these basins, with small volumes of water producing small punchbowls, and huge volumes causing massive basins. The largest punchbowl in Spencer Gorge suggests that it was once the site of a waterfall as large as the Horseshoe Falls at Niagara Falls. 🏞️

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## Ontario's Niagara Escarpment - A World Biosphere Reserve



Ontario's Niagara Escarpment stretches 725 km from Queenston, near Niagara Falls, to Tobermory, at the tip of the Bruce Peninsula. It was formed 450 million years ago along the shore of a shallow tropical sea that covered a vast area of Ontario and Michigan. Skeletons of primitive sea creatures and debris from ancient mountains were compressed into massive layers of reef and sedimentary rock. Over succeeding millions of years, erosion from glaciers, ancient rivers and lakes, and the elements sculpted the rock layers into their present form.

The Niagara Escarpment and lands in its vicinity — 183,000 hectares in eight counties and regions and 37 local municipalities — are regulated by the Niagara Escarpment Plan. Adopted by Ontario in 1985, it is Canada's first large-scale environmental land-use plan. The plan ensures that the Escarpment will be maintained substantially as a continuous natural environment. It strikes a balance between conservation, protection and environmentally compatible development.

The United Nations named Ontario's Niagara Escarpment a World Biosphere Reserve in 1990. This makes the Escarpment part of a network of protected samples of the world's major ecosystem types devoted to conservation of nature and scientific research in the service of humanity. Reserves provide a standard against which the effects of human impact on the environment can be measured. There are only six reserves in all of Canada.